

## MSL SAM-like Evolved Gas Analyses of Si-rich Amorphous Materials

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Chemical and mineralogical analyses of several samples from Murray Formation mudstones and Stimson Formation sandstones by the Mars Science Laboratory (MSL) revealed the presence of Si-rich amorphous or poorly ordered materials. It is possible to identify the presence of high-SiO<sub>2</sub> vs. lower SiO<sub>2</sub> amorphous materials (e.g., basaltic glasses), based on the position of the resulting wide diffraction features in XRD patterns from the Chemistry and Mineralogy (CheMin) instrument, but it is not possible to distinguish between several candidate high-SiO<sub>2</sub> amorphous materials such as opal-A or rhyolitic glass. In the Buckskin (BS) sample from the upper Murray Formation, and the Big Sky (BY) and Greenhorn (GH) samples from the Stimson Formation, analyses by the Sample Analysis at Mars (SAM) instrument showed very broad H<sub>2</sub>O evolutions during sample heating at temperatures >450-500°C which had not been observed from previous samples. BS also had a significant broad evolution <450-500°C. We have undertaken a laboratory study targeted at understanding if the data from SAM can be used to place constraints on the nature of the amorphous phases.

SAM-like evolved gas analyses have been performed on several opal and rhyolitic glass samples. Opal-A samples exhibited wide <500°C H<sub>2</sub>O evolutions, with lesser H<sub>2</sub>O evolved above ~500°C. H<sub>2</sub>O evolution traces from rhyolitic glasses varied, having either two broad H<sub>2</sub>O peaks, <300°C and >500°C, or a broad peak centered around 400°C. For samples that produced two evolutions, the lower temperature peak is more intense than the higher temperature peak, a trend also exhibited by opal-A. This trend is consistent with data from BS, but does not seem consistent with data from BY and GH which evolved most of their H<sub>2</sub>O >500°C. It may be that dehydration of opal-A and/or rhyolitic glass can result in some preferential loss of lower temperature H<sub>2</sub>O, to produce traces that more closely resemble BY and GH. This is currently under investigation and results will be reported.